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LUMINARY Memo #124

To: Distribution
From: Dana Densmore
Date: 11 November 1969
Subject: LUMINARY Revisions 121 - 130

Note: Revision 130 of LUMINARY was manufactured and sent to Raytheon on November 5, 1969 as the official LUMINARY 1C release. The author and drawing number is NASA 2021112-08 1.

The following changes were incorporated into Revisions 121-130:

- 1) The logic putting the LGC in P67 was deleted. Selecting manual throttle during P63, P64, P65 or P66 placed the LGC in P67 with no way of returning to auto guidance. Now, with P67 eliminated, selecting manual throttle will simply cut off the auto throttle signal with no program change occurring. A new noun, Noun 92, was created to display to the astronaut something about what the LGC's thrust command would be if the throttle was in auto. The commanded thrust is computed as a percent-of-throttle desired by the LGC (based on the DPS rated thrust of 10500 pounds). It is computed every pass through the throttle equations and displayed in Register 1 for Noun 92 as XXXXX. %. R2 and R3 are HDOT and H. The erasable defined for this is THRDISP, (PCR 285)
- 2) The Landing Radar velocity reasonability test limit was moved to erasable and named VELBIAS. It is a double-precision constant. It was formerly a 2DEC in fixed memory but PCR 943 directed that it be moved to erasable so that it could be altered as more post-flight data became available. (PCR 943)

- 3) A new flag was defined, ABTTGFLG (bit 7 of flagword 9) to help ground flight controllers to determine which targets were used during descent aborts. It is set immediately after the decision is made to use the late targets and is reset by V37. (PCR 893)
- 4) V59 was changed to allow reposition in P63. V59 moves the Landing Radar antenna from position 1 to position 2, but previously this wasn't allowed during PDI. (PCR 895)
- 5) Two padloads (AZBIAS and ELBIAS) were added to compensate for distortions in the LPD markings on the window when the LM is pressurized in space. P64 stores the padload AZBIAS into another erasable, OGABIAS, which is added to the desired outer gimbal angle in FINDCDUW. OGABIAS is zeroed in INITCDUW so that it won't affect programs other than P64. ELBIAS is added to the LPD angle before it is displayed in noun 64. (PCR 968)
- 6) Noun 07 was changed to permit one bit of a channel to be changed the same way it allowed one bit of a flagword to be changed. Formerly to change any bit the whole channel had to be written over. To change a channel bit it is now possible to key in V25 N07 E, then the channel number, then an octal code with the bit(s) to be changed set, then either a 1 or a 0 to indicate which state the bit(s) should be changed to. (PCR 806.2)
- 7) The value of ATDECAY (ascent time decay), a D. P. fixed-memory tailoff constant for the APS engine, used to predict when the APS should be shut down, was changed from 10 cs to 18 cs. (PCR 971)
- 8) The value for the DPS tailoff for P70, 100PCTTO, was changed to 24 c. s. 100PCTTO is a D. P. fixed memory constant. (PCR 846)

- 9) An absolute value instruction was removed from the sighting error found in the gravity-star alignments and displayed in N05. It had been found that this sighting error with a direction could give valuable assistance in determining the actual landing site. (PCR 972)
- 10) R60 was changed to put the mode 2 attitude errors on the BALL needles after VECPOINT computes the desired attitude instead of before. The former coding automatically called the mode 2 error displays before actually computing the new desired attitude in VECPOINT, thus erroneously displaying an "old" attitude's error on the needles. Now the displays are not called until the new attitude errors have been computed in the initial pass through VECPOINT. (Anomaly L-1B-05)
- 11) Coding was added in the Fresh Start and Restart initialization logic (at the end of STARTSB1) to increment STILBADH and STILBADV to prevent incorporation of the next landing radar altitude and velocity readings. This is done only if the landing radar bypass flag is off, that is, if we are in a descent program or P12. This check is made to avoid conflict with erasables sharing with STILBADH and STILBADV. (Anomaly L-1B-09)
- 12) A change was made in the DAP to correct for possible DAP overshoot when the Attitude Controller is cycled in and out of detent in the manual rate command mode. The JUSTIN bit is now set every time the Attitude Controller is deflected. Formerly if it was cycled in and out in a certain rapid timing sequence, the DAP would have entered the attitude hold mode immediately instead of just damping the spacecraft rates as desired. (Anomaly L-1B-10)

- 13) A change was made in R04 (radar self-test routine) to test erasable RTSTBASE instead of bits 2 and 3 of RTSTDEX. Testing the wrong erasable here had resulted in a proceed response to V16 N78 going to sample the rendezvous radar again, displaying V16 N72, instead of going on to read the landing radar (which displays V16 N66). (Anomaly LNY 75)
- 14) A change was made in MARKRUPT entrance to check for an ROD bit rather than for the absence of a mark button bit in channel 16 as the decision for entering P66 where RODCOUNT will be incremented. This protects us against being locked out of P66 if one of the channel bits associated with MARKX, MARKY, or MKREJECT was stuck on. (ACB L-7)
- 15) A block of constants used only in interpretive was moved from FBANK 5 to FBANK 4 to make room for the fix to Anomaly L-1B-09. Eleven locations were affected. To make this change the SETLOC tag at the beginning of the block (ORBITAL3) was moved in the TAGS log section from being defined for Bank 5 to being defined for Bank 4. (ACB L-9)